Hello and Welcome to Pre-Calculus!

I hope you are finishing up your last couple of assignments and getting ready for summer. I know this year hasn't been quite what we expected and I know I'm ready for a new year. I am so excited to have you in Pre-Calculus and I hope you're excited as well.

Pre-Calculus is the prerequisite for Calculus so the main purpose of this class is to cover topics that will help you be more successful in Calculus and beyond. Many of you will go on to take Calculus next year or in college and will need to know the topics well, especially those in second semester. This summer, I wanted to provide an assignment that will focus on the review from Algebra 2, so we can begin the year by diving into Pre-Calculus topics as early as possible. The attached packet has many problems that are a good review of three key topics from Algebra 1 and Algebra 2: Linear functions and inequalities, Matrix Operations, Regression Models and Factoring Quadratics. You should be familiar with these and have worked with them in previous years. If you don't remember them or you're struggling with these practice problems there's some great tools and videos on Khan Academy you can look at.

The amount of work you put into this packet is up to you - I will not be collecting it and giving you a grade on it. We will spend a little time the first week of school going over these types of problems, completing some additional practice where needed. You will have a test on these topics shortly after that which will count as your first grade for the year. Those of you that have difficulty on this assessment will have the opportunity to retake it for an improved grade; however, as a class we will be moving forward. As stated at the beginning, in order to prepare you for Calculus, we have to get through a significant amount of material that can only be possible if we move through the review quickly. Work on what you need to work on to make sure this first test is successful, but don't waste your time on something you already know.

I'm excited for our class next year and hope you have a wonderful summer!

Miss Sobanski

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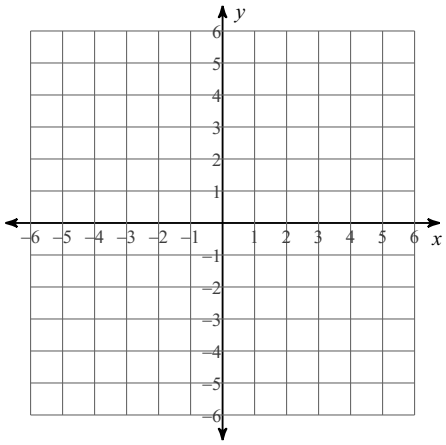
Chapter P: Part 1 - Linear Functions

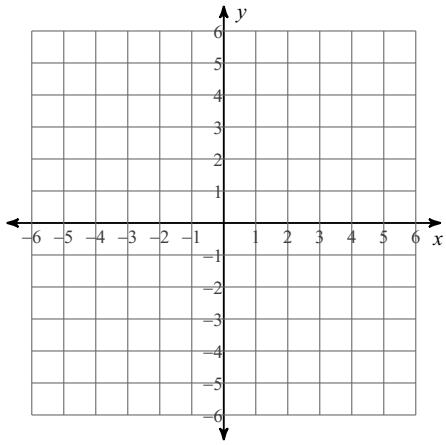
Date_____ Period____

Sketch the graph of each line.

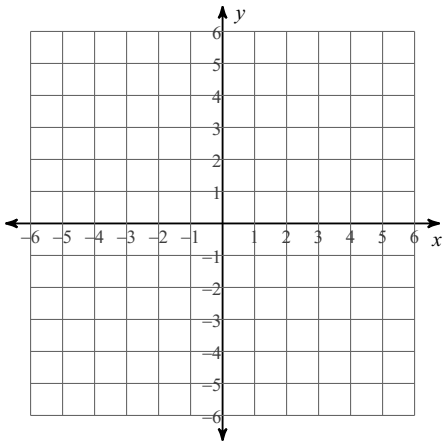
1) x-intercept = 1, y-intercept = –5



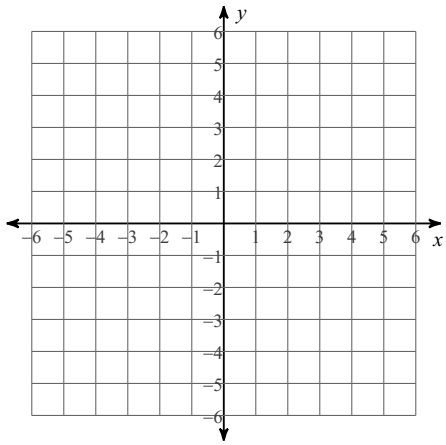
2) x-intercept = –5, y-intercept = –5



3) $y = 2x - 1$

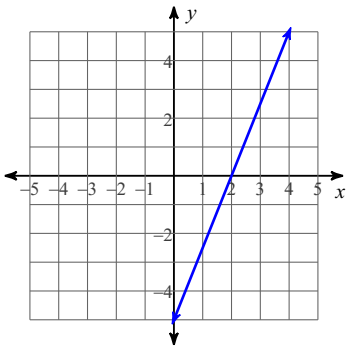


4) $y = x - 3$



Write the slope-intercept form of the equation of each line.

5)



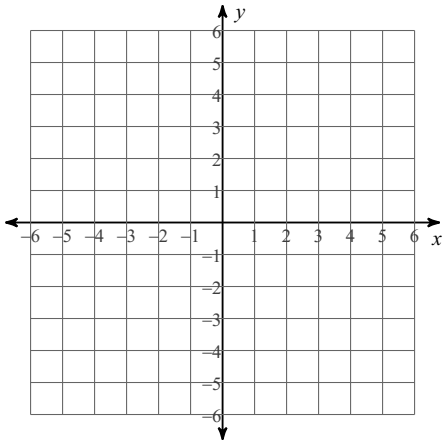
6) Slope $= -\frac{1}{2}$, y-intercept $= 2$

7) through: $(-2, -1)$, slope $= \frac{5}{2}$

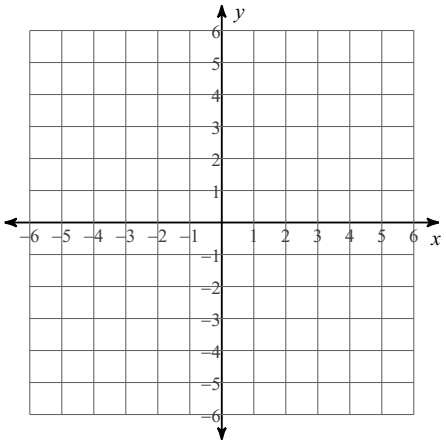
8) through: $(1, -2)$ and $(0, 3)$

Sketch the graph of each linear inequality.

9) $y \leq -\frac{4}{3}x - 1$



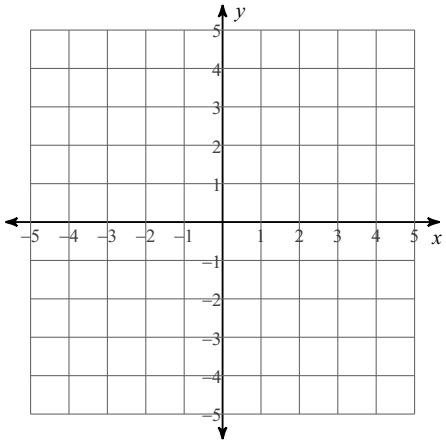
10) $y \leq \frac{1}{4}x + 5$



Sketch the solution to each system of inequalities.

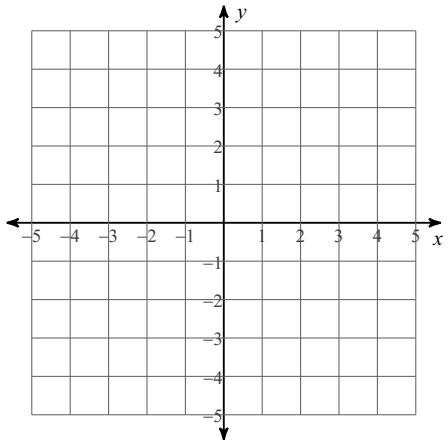
11) $y < -\frac{1}{3}x + 2$

$x < 3$



12) $y > x + 1$

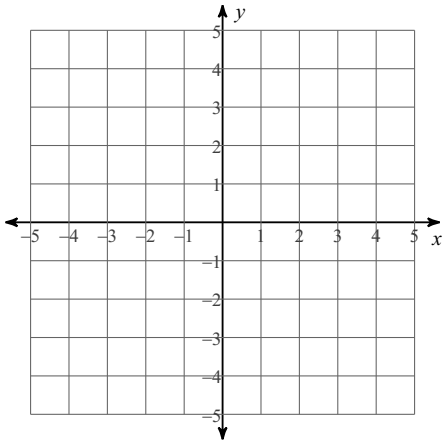
$y \geq 5x - 3$



Solve each system by graphing.

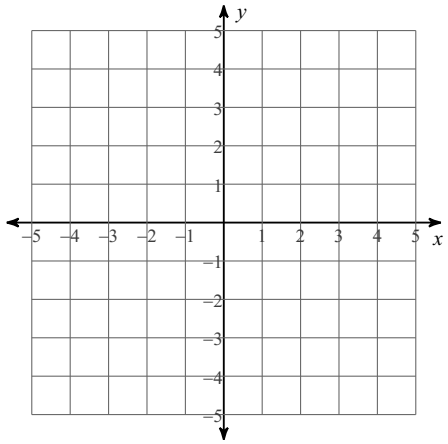
13) $y = -\frac{2}{3}x + 1$

$y = -2x - 3$



14) $y = \frac{1}{2}x + 3$

$y = -\frac{1}{2}x + 1$



Solve each system by substitution.

15) $y = -2x + 7$
$y = 3x - 18$

16) $y = 4x - 16$
$4x + 3y = 0$

Solve each system by elimination.

17) $2x + y = -2$
$9x + 4y = -9$

18) $10x + 7y = -10$
$-4x - 8y = 4$

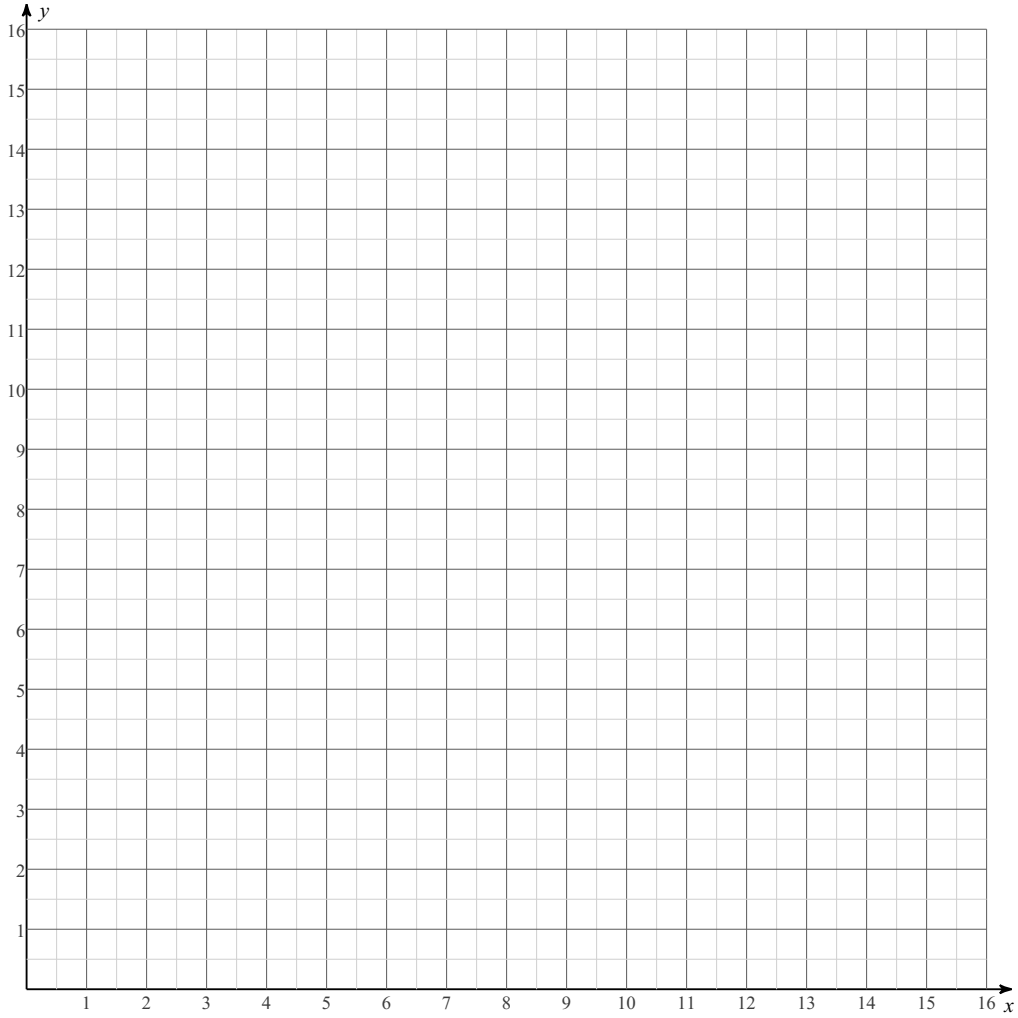
19) The school that Emily goes to is selling tickets to the annual talent show. On the first day of ticket sales the school sold 7 adult tickets and 10 child tickets for a total of $155. The school took in $60 on the second day by selling 1 adult ticket and 9 child tickets. Find the price of an adult ticket and the price of a child ticket.

Solve each system by elimination.

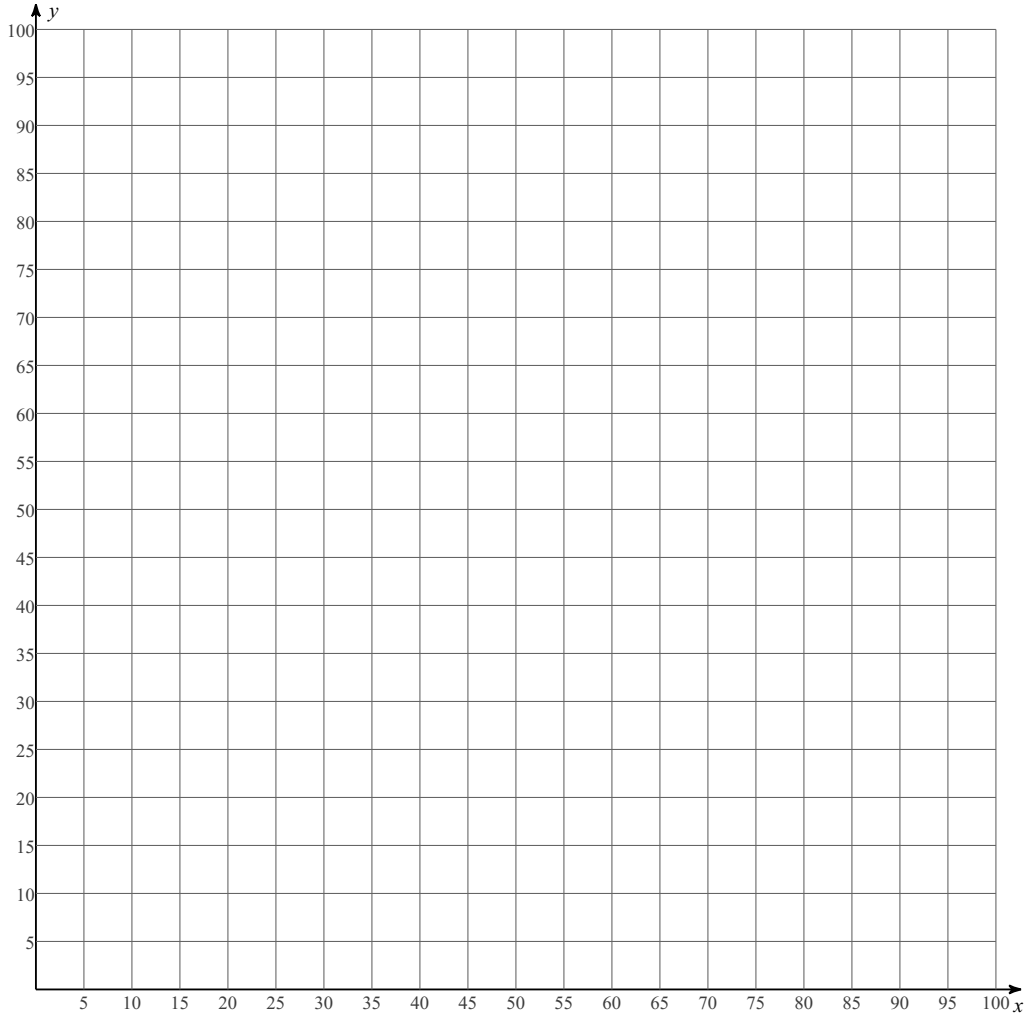
20) $2x + y - z = -10$
$-x + y - 3z = -4$
$x + 3y - 5z = -16$

Using the given information, determine the maximum for each situation. Make sure you define the variables, create and graph the constraints, define an objective funciton, and test each of the verticies to determine the correct answer.

21) You need to buy some filing cabinets. You know that Cabinet X costs $10 per unit, requires six square feet of floor space, and holds eight cubic feet of files. Cabinet Y costs $20 per unit, requires eight square feet of floor space, and holds twelve cubic feet of files. You have been given $140 for this purchase, though you don't have to spend that much. The office has room for no more than 72 square feet of cabinets. How many of which model should you buy, in order to maximize storage volume?



22) A snack bar cooks and sells hamburgers and hot dogs during football games. To stay in business, it must sell at least 10 hamburgers but can not cook more than 40. It must also sell at least 30 hot dogs, but can not cook more than 70. The snack bar can not cook more than 90 items total. The profit on a hamburger is 33 cents, and the profit on a hot dog is 21 cents. How many of each item should it sell to make the maximum profit?



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Chapter P: Part 2 - Matrix Operations

Date_____ Period____

Simplify. Write "undefined" for expressions that are undefined.

1) $\begin{bmatrix} 0 \\ -5 \\ -2 \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \\ -5 \end{bmatrix}$

2) $\begin{bmatrix} 3 \\ -4 \end{bmatrix} - \begin{bmatrix} 5 \\ 4 \end{bmatrix}$

3) $-5\begin{bmatrix} 0 & 6 & -4 \end{bmatrix}$

4) $3\begin{bmatrix} -5 & 2 & 6 & 1 \end{bmatrix}$

5) $\begin{bmatrix} -2 & 5 & -6 \\ -5 & -1 & -1 \end{bmatrix} \cdot \begin{bmatrix} 5 & -3 \\ -6 & -1 \\ -4 & 0 \end{bmatrix}$

6) $\begin{bmatrix} -5 & 2 & -2 \\ 0 & -5 & 3 \end{bmatrix} \cdot \begin{bmatrix} 3 & 0 \\ -6 & -5 \\ -2 & 0 \end{bmatrix}$

Evaluate each determinant.

7) $\begin{vmatrix} -5 & 2 \\ 3 & 0 \end{vmatrix}$

8) $\begin{vmatrix} 2 & 1 \\ 0 & -5 \end{vmatrix}$

9) $\begin{vmatrix} -4 & 2 & -2 \\ 3 & 1 & 0 \\ -4 & -3 & 1 \end{vmatrix}$

10) $\begin{vmatrix} -1 & -5 & -3 \\ 4 & 5 & -1 \\ -1 & -2 & 1 \end{vmatrix}$

Find the inverse of each matrix.

11) $\begin{bmatrix} -7 & 9 \\ 7 & 9 \end{bmatrix}$

12) $\begin{bmatrix} 4 & 0 \\ 7 & 1 \end{bmatrix}$

13) $\begin{bmatrix} 3 & 2 & 3 \\ -3 & -4 & 1 \\ 0 & -2 & -1 \end{bmatrix}$

14) $\begin{bmatrix} 0 & 1 & 2 \\ 5 & -1 & 2 \\ -1 & -4 & -2 \end{bmatrix}$

Solve each equation or state if there is no unique solution.

15) $\begin{bmatrix} 0 \\ -6 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix} Z$

16) $\begin{bmatrix} -40 & -31 \\ 27 & 8 \end{bmatrix} = \begin{bmatrix} -2 & -7 \\ 3 & -4 \end{bmatrix} - \left(\begin{bmatrix} 7 & -3 \\ -4 & 2 \end{bmatrix} X \right)$

Use Cramer's Rule to solve each system.

17) $-2x - 5y = 17$
$-6x - 2y = -14$

18) $2y - 6z = 0$
$-x + y - 4z = -1$
$2x + 4y - 2z = -6$

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Chapter P - Part 3: Linear Regression

Date_____ Period____

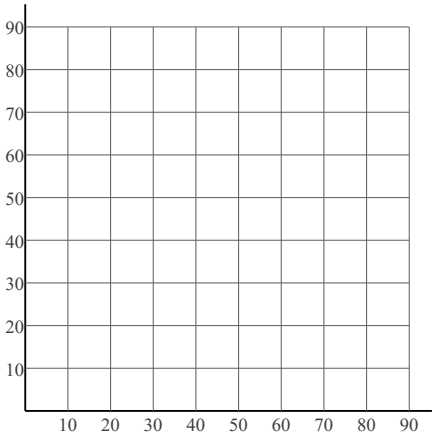
Construct a scatter plot. State the type of correlation. When there is a correlation, identify the relationship as linear, quadratic, or exponential. Also find the LSRL of that best fits the data and its r^2 value.

1)

X	Y
2	50
6	40
7	20
20	90

X	Y
36	50
37	50
48	80

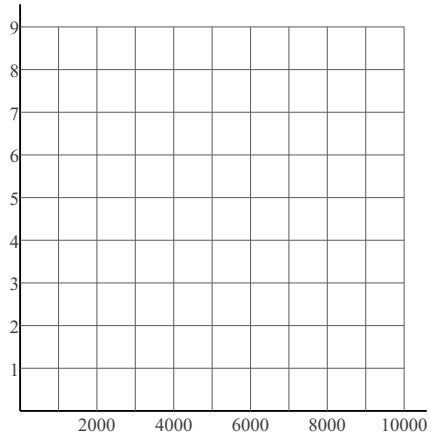
X	Y
54	20
80	30
90	50



2)

X	Y
1,000	2
3,000	5
3,000	5
5,000	7
6,000	8

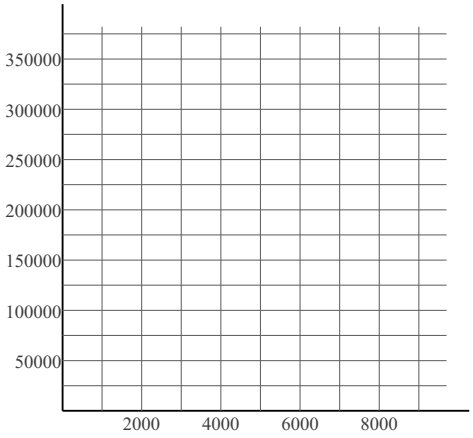
X	Y
6,000	8
8,000	8
8,000	9
9,000	8
10,000	8



3)

X	Y
200	3
2,300	70
3,700	370
4,600	1,040
5,800	4,250

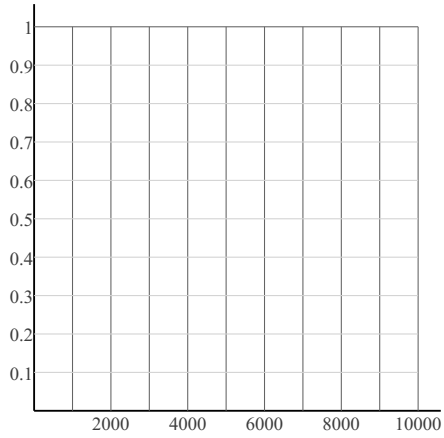
X	Y
6,900	13,910
7,500	29,200
8,000	52,370
9,000	180,420
9,700	382,000



4)

X	Y
1,000	0.6
4,000	0.4
5,000	0.3
6,000	0.3
7,000	0.2

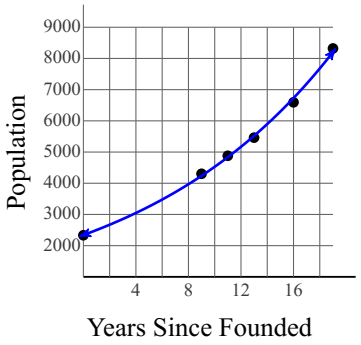
X	Y
8,000	0.2
9,000	0.1
9,000	0.1
10,000	0.1
10,000	0.1



5) The population of a city is given for several years:

Year	Population
0	2,330
9	4,300
11	4,880
13	5,460
16	6,590
19	8,320

This can be modeled by the equation $y = 2340 \cdot 1.07^x$ where x is the number of years since the city was founded and y is the population.



a) What does the y-intercept of this function represent?

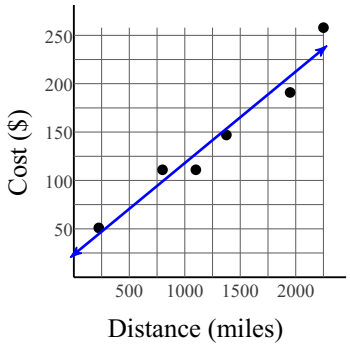
b) According to the model, what was the city's population 6 years after it was founded? Round your answer to the nearest hundred.

c) Based on the model, after how many years was the population 2,900? Round your answer to the nearest year.

6) The cost of a flight is related to the distance traveled:

Miles	Cost ($)
225	50.9
800	111
1,100	111
1,375	147
1,950	191
2,250	258

This can be modeled by the equation $y = 0.0946x + 23.5$ where x is distance in miles and y is cost in dollars.



a) What does the slope of the line represent?

b) What does the y-intercept of this function represent?

c) Using this model, what would be the cost of a flight that travels 525 miles? Round your answer to the nearest dollar.

d) What distance corresponds to a cost of $180? Round your answer to the nearest mile.

Chapter P: Part 4 - Factoring

Date_____ Period____

Factor each completely.

1) $x^4 - 8x^3 - 20x^2$

2) $3m^3 - 15m^2 - 108m$

3) $7n^3 + 3n^2$

4) $7x^3 + 10x^2$

5) $9m^2 - 64m + 60$

6) $9a^2 + 71a - 8$

7) $4x^2 - 1$

8) $x^2 + 6x + 9$

Solve each equation by taking square roots.

9) $6n^2 + 9 = 309$

10) $64m^2 + 3 = 52$

Solve each equation by factoring.

11) $x^2 = -10x - 24$

12) $k^2 = 16 - 6k$